

THE PLUG COMPATIBLE INDUSTRY

OVERVIEW AND TRENDS

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INPUT

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MAJOR CONCLUSIONS

- IT WILL BE MORE DIFFICULT FOR PCs TO COMPETE OVER THE NEXT SEVERAL YEARS
- IBM HAS MADE MAJOR TECHNOLOGICAL BREAKTHROUGHS WITH NEW SYSTEMS
 - 4300 (4 MODELS)
 - 8100
 - SYSTEM 38
 - H-SERIES (4 TO 5 MODELS)
 - NEW ROTATING STORAGE DEVICES AT 4X DENSITY
 - 64,000 RAM CHIP AT \$0.15/BYTE
- MAJOR PORTIONS OF OPERATING SYSTEMS IN GP MACHINES (4300 AND H-SERIES) TO BE IMPLEMENTED IN FIRMWARE
- H-SERIES WILL RUN NEW RELATIONAL DBMS (SYSTEM R), LARGELY IMPLEMENTED IN FORMWARE
- IBM'S AGGRESSIVE PRICING IMPACTING PCs REVENUES AND PROFITS



MAJOR CONCLUSIONS

- DOCUMENTATION ON NEW SYSTEMS WILL NOT BE RELEASED UNTIL FIRST CUSTOMER SHIPMENT

- RELEASED DOCUMENTATION WILL NOT CONTAIN DETAILS SUFFICIENT TO COPY SYSTEMS
 - DETAILED LOGIC DIAGRAMS, ETC. WILL BE AVAILABLE ONLY AT IBM "SYSTEM SUPPORT CENTERS"

 - IBM FIELD SERVICE WILL HAVE ONLY "BIT PATTERNS"

- THE UNITED STATES GOVERNMENT ANTI-TRUST ACTION IS COMPLETELY STALLED
 - IBM HAS WON EVERY PRIVATE CASE IN COURT (GREYHOUND, MEMOREX, TELEX, TRANSAMERICA)

 - IBM CONTRIBUTES TO UNITED STATES BALANCE OF PAYMENTS AND NATIONAL PRESTIGE

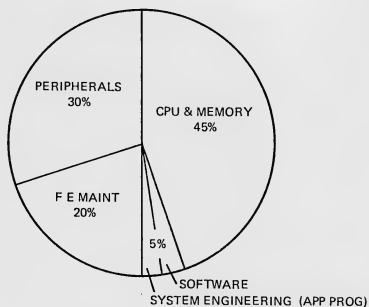
MAJOR CONCLUSIONS

- IBM's NEW PRICING POLICIES WILL EMPHASIZE "PAY FOR WHAT YOU GET"
 - AS HARDWARE COSTS DECREASE, IBM WILL INCREASINGLY EMPHASIZE SOFTWARE, SUPPORT, AND MAINTENANCE AS PRIMARY REVENUE AND PROFIT GENERATORS
 - PC VENDORS WILL HAVE TO IMPLEMENT A STRONG SOFTWARE AND SUPPORT PROGRAM TO COMPETE
- ALL 4300 AND H-SERIES MACHINES WILL BE FULLY SOFTWARE COMPATIBLE WITH 370 FOR APPLICATIONS SOFTWARE
 - AMERICAN USERS WILL NOT ACCEPT ANY SYSTEM THAT WILL NOT RUN EXISTING SOFTWARE

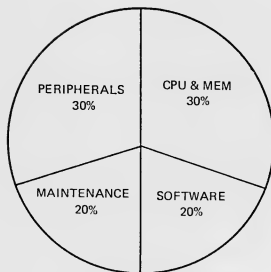
MAJOR CONCLUSIONS

- IBM WILL EVENTUALLY DROP SUPPORT OF ALL "PUBLIC DOMAIN" OPERATING SYSTEMS EXCEPT VM AND MVS
 - VM WILL STAY IN PUBLIC DOMAIN
 - MVS WILL HAVE MICROCODED INSTRUCTIONS FOR BOTH 4300 AND H-SERIES
- PROGRAM PRODUCTS WILL BE A MAJOR REVENUE PRODUCING THRUST OF IBM
- IBM WILL SELL SOFTWARE TO ANY PCM
 - MACHINE OWNERSHIP GUARANTEES SUPPORT
- PCMs PROVIDE SUPPORT AT NO CHARGE
 - IBM WILL CHARGE \$45 TO \$75 PER HOUR FOR ON-SITE SUPPORT
 - CALLS TO SYSTEM CENTER NOT CHARGED

REVENUE SHIFT: HARDWARE TO SOFTWARE



1978 IBM REVENUE SHARES



1982 IBM REVENUE SHARES

MAJOR CONCLUSIONS

- EXISTING 370 SYSTEMS SOFTWARE WILL RUN ON NEW MACHINES
 - NEW SYSTEM SOFTWARE DEVELOPMENT WILL FOCUS ON UTILIZING FIRMWARE OF NEW MACHINES
 - ALL SOFTWARE VERSIONS OF NEW SYSTEMS SOFTWARE WILL RUN ON 370, BUT VERY INEFFICIENTLY
 - STRATEGY IS TO GET USERS TO UPGRADE TO NEW MACHINES TO OBTAIN INCREASED EFFICIENCY ONLY AVAILABLE ON THEM
 - VM AND MVS BRIDGE TO H-SERIES, CUSTOMER PREPARES NOW
 - CENTRAL SITE SOFTWARE STRATEGIES MEANS "LOCK IN AND CONTROL" ESPECIALLY FOR DBMS AND DDP

MAJOR CONCLUSIONS

- IBM WILL MOVE AGGRESSIVELY TO MAINTAIN AND EXPAND DOMINANCE IN SOFTWARE

- SOFTWARE STRATEGY BUILT ALONG LINES OF FOUR-TIER STRUCTURE:
 - LEVEL 1: SYSTEM CONTROL PROGRAM WITH ENABLING MICROCODE

 - LEVEL 2: "ADVANCED FUNCTION SYSTEMS" E.G., DATA BASE, DATACOM SOFTWARE

 - LEVEL 3: PROGRAM PRODUCTS INCLUDING LANGUAGES, SUBROUTINES, AND OTHER APPLICATIONS ENABLERS

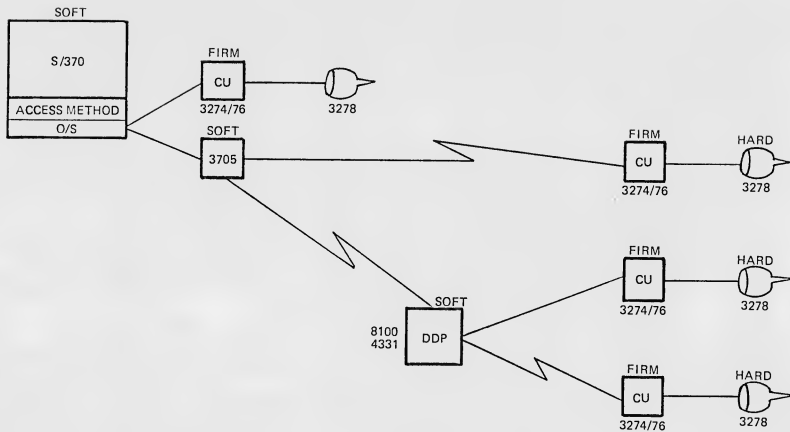
 - LEVEL 4: APPLICATION PROGRAM

- SYSTEM WILL MAKE IT DIFFICULT FOR VENDORS TO COMPETE AT FOURTH LEVEL

MAJOR CONCLUSIONS

- IBM's MAINTENANCE POLICIES WILL BE "FLEXIBLE"
ACCORDING TO CUSTOMER
 - LARGE CUSTOMERS WILL BE ABLE TO GET MORE
COOPERATION THAN SMALL ONES
 - IBM WILL NOT MAINTAIN ANY EQUIPMENT OTHER
THAN ITS OWN SYSTEMS
 - SYSTEMS SOFTWARE AND HARDWARE MAINTENANCE
ARE INTEGRATED AT IBM
- SYSTEMS MUST BE FULLY COMPATIBLE WITH SNA
STANDARDS AND SDLC PROTOCOLS
- PC VENDORS MUST STAY CONSISTENT WITH IBM's H/F/S
STRATEGIES
 - E.G., LITTLE ADVANTAGE TO OFFERING ADDITIONAL
INTELLIGENCE AT THE DISPLAY TERMINAL LEVEL
 - IBM HOST SOFTWARE WILL PROVIDE THE REQUIRED
INTELLIGENCE

HARDWARE FIRMWARE/SOFTWARE INTEGRATION



PENDING ANNOUNCEMENTS

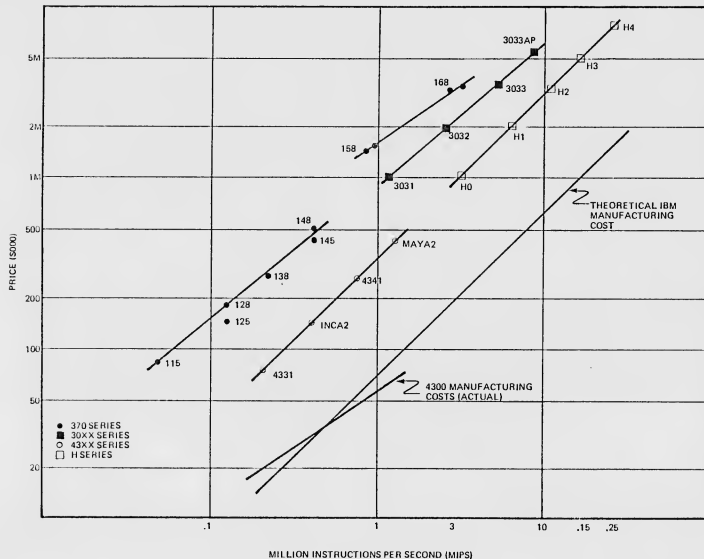
- INTELLIGENT PABX FOR U.S. A POSSIBILITY
- LARGE SCALE SYSTEMS FOR SECOND HALF 1980
 - DELIVERY SCHEDULE
 - FINANCIAL CONSIDERATIONS
 - COMPETITION
 - SOFTWARE
 - RELATIONAL DBMS
 - ON SAME PRICE/PERFORMANCE CURVE AS THE 4300
- IMAGE PROCESSING
 - VIDEODISK
- EXTEND 4300
- DOS ON SERIES/1

MAINFRAMES

IBM PCM PARTICIPANTS

IBM CPU Plug Compatible Manufacturers and/or Marketers	.3 to .6 MIPS	.6 to 1. MIPS	1 to 2 MIPS	2 to 3 MIPS	3 to 5 MIPS	5 to 9 MIPS	9 to 13 MIPS
AMDAHL			Design not sold	V5,6	V7,8		
CAMBRIDGE MEM. INC, CMI	1/79	from IPL					
CONTROL DATA CORP, CDC		78 from	IPL				
HITACHI				AS6	sold by ITEL	AS8	
ITEL		AS3 NS	AS5.3 NS	AS6 Hit	AS7 1/80		
IPL, 40% Owned by CMI	to CMI NCSS	to CDC	to ITEL				
MAGNUSON	1/79	9/79	9/80				
NANODATA	7/79 to Nixdorf	7/80					
NATIONAL CSS	2 Pi CMI						
NATIONAL SEMICONDUCTOR	TO NIXDORF 400 DIRECT		AS3 DIRECT AS5.0 TO ITEL	9/79 Lightning			
NIXDORF (Scrapped in-house)	7/79 NS400						
TWO PI (Philips)	9/78	9/80					
Being Developed: MICROCOMPUTER SYSTEMS				6/79 R1	1/81 R2		

PRICE/PERFORMANCE:IBM CURRENT AND FUTURE



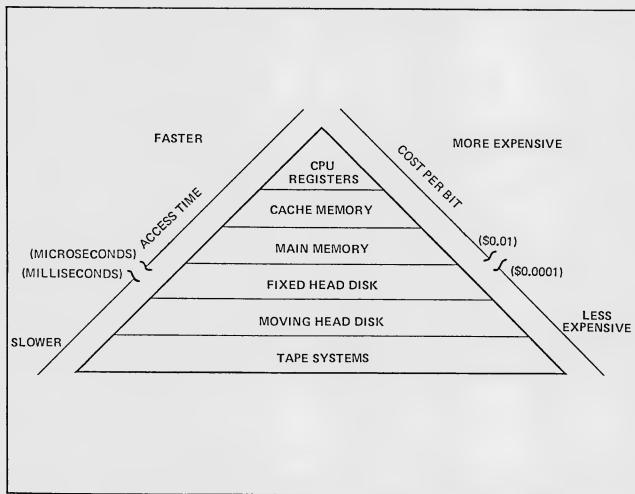
STORAGE PERIPHERALS

STORAGE PERFORMANCE CONSIDERATIONS

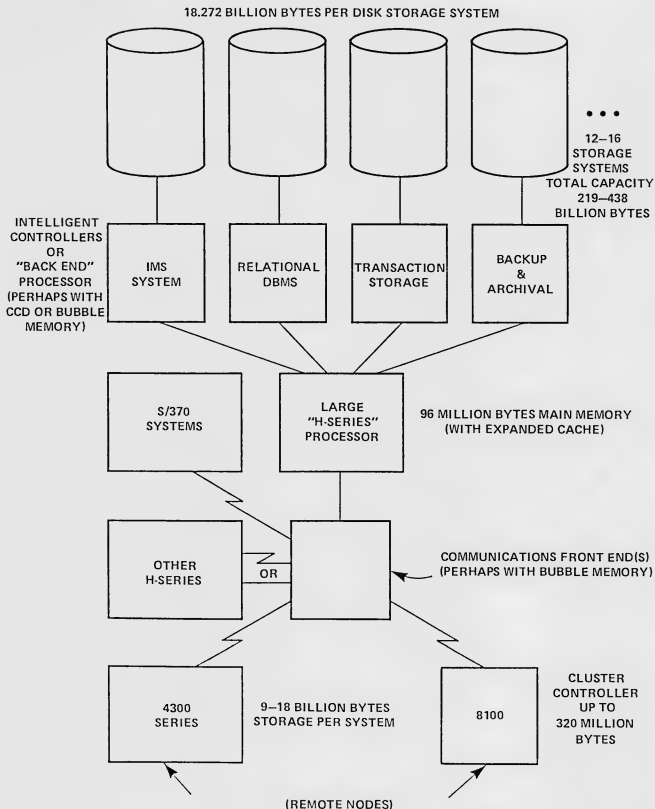
- OVER THE LAST FEW YEARS CPU PRICE/PERFORMANCE HAS IMPROVED BY A FACTOR OF 15, WHILE STORAGE PERIPHERALS HAVE IMPROVED ONLY BY A FACTOR OF 4
 - THE BALANCE OF HARDWARE SYSTEMS COSTS HAS CHANGED DRAMATICALLY AND WILL CONTINUE TO DO SO

- PC STORAGE SUPPLIERS HAVE AN UNIQUE OPPORTUNITY IF THEY CAN CAPITALIZE ON ADVANCED TECHNOLOGY
 - ESTIMATES OF DISC STORAGE MARKET GROWTH RANGE FROM 22-45% ANNUALLY OVER THE NEXT FIVE YEARS
 - NEW PROGRAMS HIGHLY INTERACTIVE AND REQUIRE EXPANDED DASD CAPABILITIES

THE MEMORY HIERARCHY



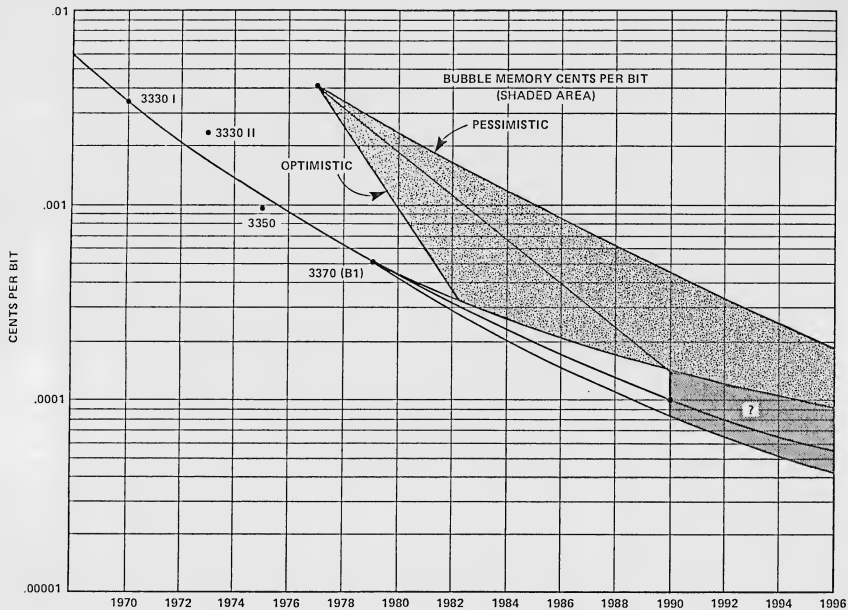
STORAGE DISTRIBUTION ON FUTURE SYSTEMS



PRICE HISTORY OF
IBM 3330-1, 3330-11, 3350-B2 AND 3370-B1 DISK DRIVES

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979
<div>3330-1</div> <div>200 MB</div> <div>(6/70) \$51,940 \$260/MB</div>			<div>(10/73) \$52,900 \$265/MB</div>		<div>(7/75) \$47,610 \$238/MB</div>		<div>(4/77) \$40,470 \$202/MB</div>		<div>(5/79) \$32,380 \$162/MB</div>
			<div>3330-11</div> <div>400 MB</div> <div>(7/73) \$74,000 (10/73) \$75,400 \$185/MB \$189/MB</div>		<div>(7/75) \$67,860 \$170/MB</div>		<div>(4/77) \$57,610 \$144/MB</div>		<div>(5/79) \$46,090 \$115/MB</div>
					<div>3350-B2</div> <div>635 MB</div> <div>(7/75) \$49,500 \$78/MB</div>			<div>(10/78) \$39,600 \$62/MB</div>	<div>(5/79) \$31,680 \$50/MB</div>
									<div>3370-B1</div> <div>571 MB</div> <div>(2/79) \$23,400 \$41/MB</div>

STORAGE COST PROJECTIONS



TERMINALS

TERMINALS

- 327X WILL CONTINUE TO BE IBM's PRINCIPAL DISPLAY SYSTEM FOR NEXT SEVERAL YEARS. PHILOSOPHY WILL BE MAINTAINED
 - RELIANCE ON SNA
 - COMMITMENT TO SDLC PROTOCOLS
 - SOFTWARE RESIDENT IN HOST
- IBM HAS TARGETED ON MAINTAINING 60 PERCENT MARKET SHARE
 - 40 PERCENT "OPPORTUNITY" WINDOW FOR PC VENDORS
- UNTIL AT LEAST 1981 - 1982, IBM WILL EMPHASIZE 3274/6/8 SERIES

TERMINALS

- PC VENDORS HAVE MADE SIGNIFICANT INROADS. IBM HAS COUNTERED BY:
 - REDUCING LEASE PRICES AND OFFERING TWO YEAR LEASES WITH PURCHASE OPTION CREDITS
 - REDUCING COSTS BY GOING TO HIGH VOLUME PRODUCTION CUSTOM LSI
 - MOVING INTELLIGENCE TO CONTROLLERS
 - EXPANDING INTO NEW MARKETS, COLOR GRAPHICS AND ASCII
- IBM HAS TIGHTENED DOCUMENTATION POLICIES SIGNIFICANTLY
 - MORE DIFFICULT FOR PC VENDORS TO OBTAIN INTERFACE DATA
 - UNITED STATES JUSTICE DEPARTMENT UNLIKELY TO HELP NOW

TERMINALS

- 8100 AND SYSTEM/38 EACH HAVE THEIR OWN DISPLAY DEVICES
 - 327X COULD SERVE ALL SYSTEMS EQUALLY WELL
 - INTERNAL COMPETITION FORCED IBM TO DUPLICATE EFFORT
 - BY MAINTAINING THREE SYSTEMS, IBM KEEPS ITS OPTIONS OPEN
- INPUT BELIEVES 3274/6/8 PROGRAM IS TARGETED AT SIX-YEAR LIFE CYCLE
 - NEW SYSTEM DELIVERIES NOT ANTICIPATED UNTIL 1983
- IBM IS FOLLOWING A CONSISTENT HARDWARE/FIRMWARE/
SOFTWARE (H/F/S) STRATEGY
 - SOFTWARE IS THE PROVINCE OF THE HOST COMPUTER
 - FIRMWARE ESTABLISHED IN CONTROLLERS
 - DISPLAY DEVICES HARDWIRED

COMPETITION/MARKETS

- COMPETITORS TO 327X ARE OF THREE TYPES:

1. PC VENDORS OF INDIVIDUAL COMPONENTS

- MEMOREX
- COMPUTER OPTICS
- GENESIS ONE

2. SYSTEM COMPATIBLE VENDORS

- TELEX
- TRIVEX
- COURIER (ITT)
- SYCOR (OLIVETTI)
- RAYTHEON

3. SYSTEM VENDORS PROVIDING 327X COMPATIBILITY PLUS LOCAL PROGRAMMABILITY

- FOUR PHASE
- SYCOR
- DATAPOINT
- HARRIS

COMPETITION/MARKETS

- NOW THAT 4300 DIRECTLY SUPPORTS 327X,
MOST TYPE 2 VENDORS WILL FOCUS ON
3278 DISPLAY
- TYPE 3 VENDORS WILL BE FORCED TO DEVELOP
EXTENSIVE, SOPHISTICATED SOFTWARE (PROGRAM
PRODUCTS) TO MAINTAIN A VIABLE MARKET
POSITION

